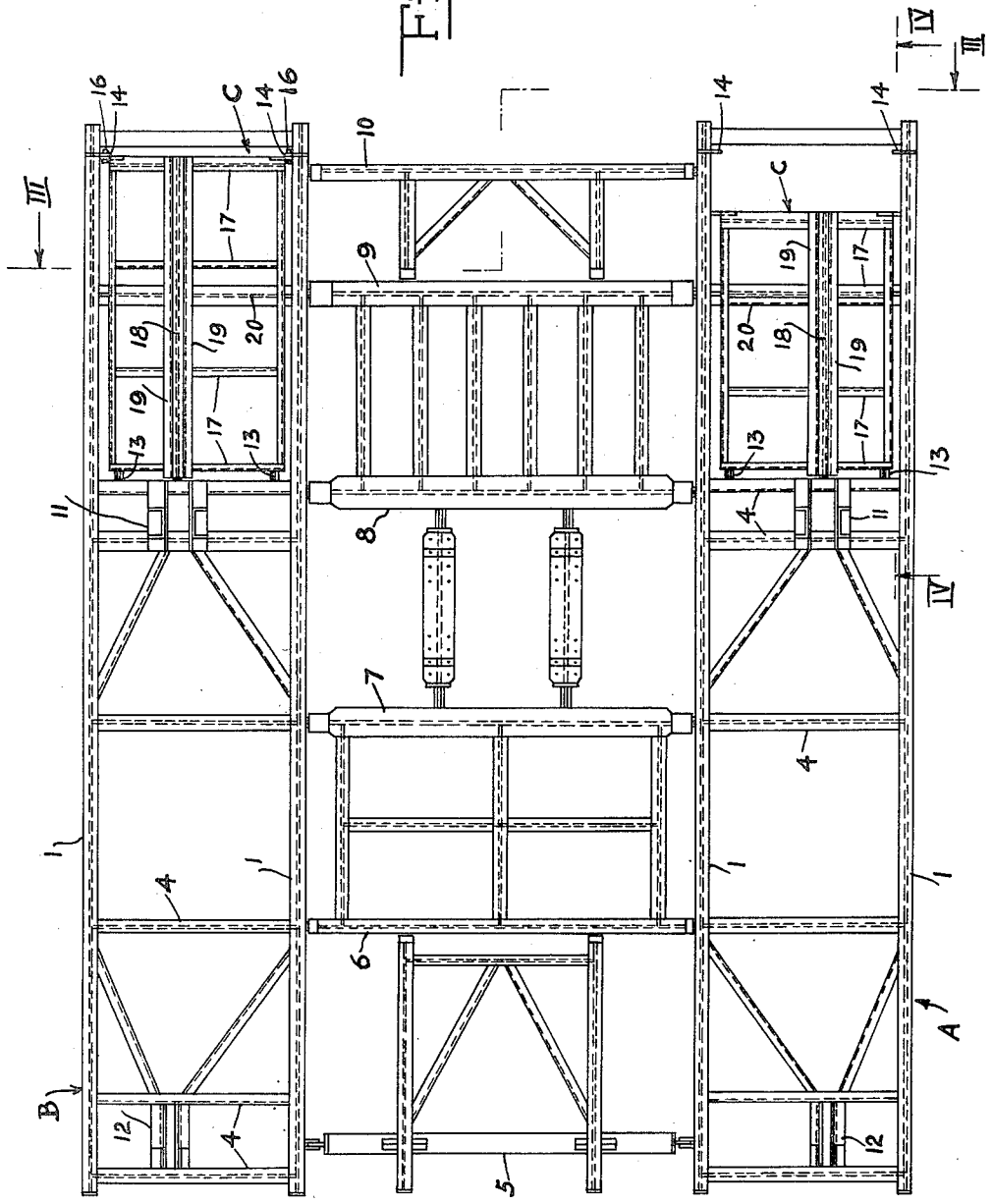
June 28, 1955 H. J. WOOLSLAYER ET AL 2,711,804

OIL WELL DRILLING STRUCTURE

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Fig. 1.



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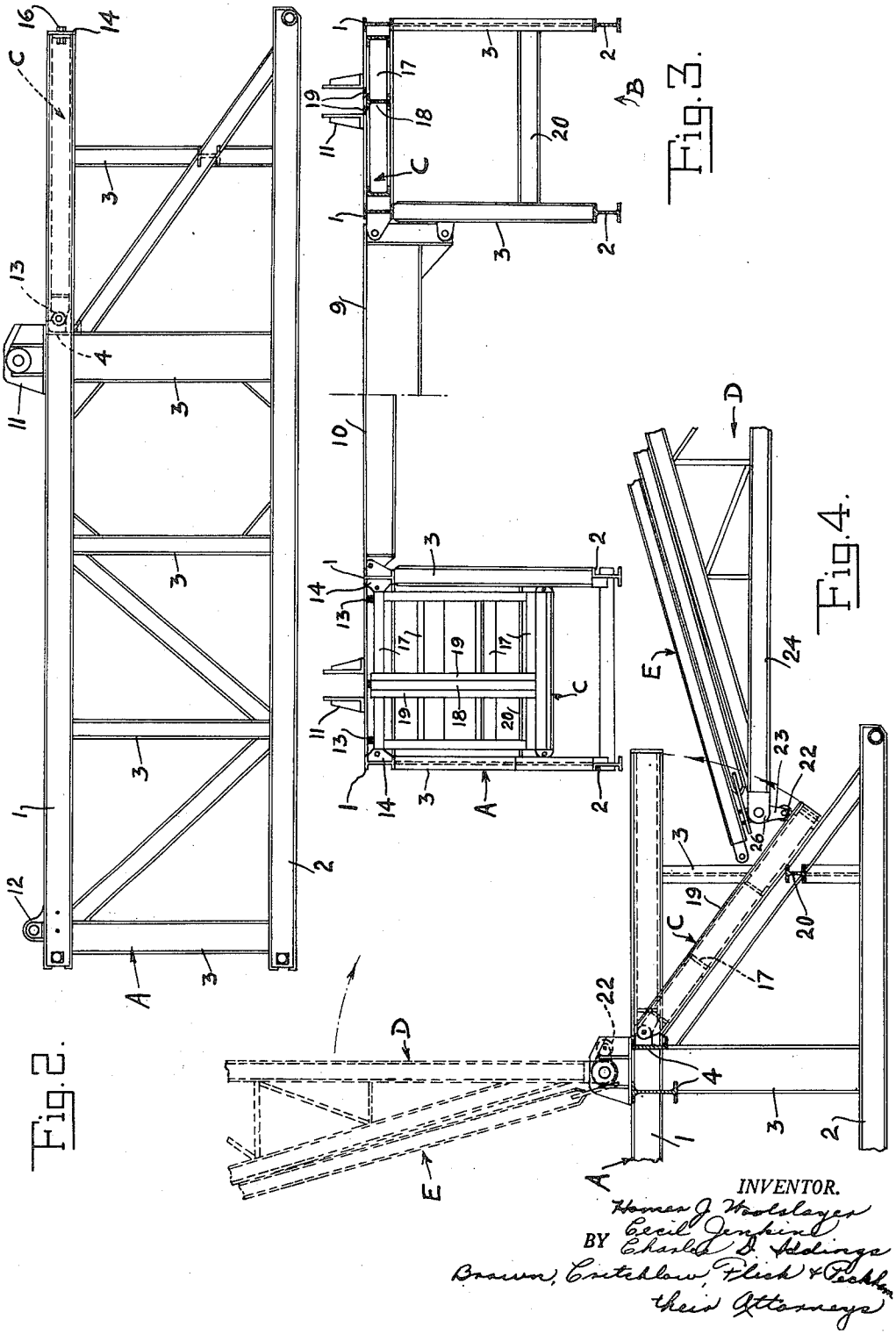


Fig. 2.

Fig. 3.

Fig. 4.

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United States Patent Office 2,711,804 Patented June 28, 1955

2,711,804

OIL WELL DRILLING STRUCTURE

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Application August 22, 1950, Serial No. 180,844

3 Claims. (Cl. 189—15)

This invention relates to oil well drilling structures, and more particularly to the substructures that support the drilling derricks.

In modern oil well drilling practice the derrick or mast generally is assembled in a reclining position along the ground. Two feet of the mast then are pivoted to shoes on a substructure, and the mast is swung up into upright position above the substructure and fastened there. In some cases the substructure is so high that it becomes necessary to raise the foot of the reclining mast several feet before it can be pivoted to the shoes on the substructure. This present quite a problem.

It is among the objects of this invention to provide a well drilling structure including a substructure which has ramps for raising the foot of a reclining mast to the level of shoes on top of the substructure, and which has means for covering the open areas above the inclined ramps after the mast has been raised. Another object is to provide such a well drilling structure in which normal variations in height of the outer end of the reclining mast will not interfere materially with connection of its feet to shoes on the substructure.

In accordance with this invention a substructure framework supports a pair of laterally spaced shoes near its front end. Ramps are disposed in front of the shoes, preferably in downwardly extending recesses in the substructure. A drilling mast extends above the substructure, and has a pair of feet at its lower end detachably pivoted to the shoes. Small rollers project a very short distance from the front side of the mast approximately in front of its feet. These rollers are adapted to engage the upper ends of the ramps when the mast is swung forward and down to reclining position along the ground. When that is done and the feet have been disconnected from the shoes, the rollers can roll down the ramps to carry the foot of the mast down to a lower level. In connecting the mast to the substructure and raising it, the procedure just outlined is reversed. While the mast is in upright position the tops of the recesses in which the ramps are disposed are covered by removable cross members so that a floor can be laid over them. It is preferred to form these cross members and ramps into structural steel slabs that are hinged at their inner ends to the substructure framework. The slabs therefore can be swung from an inclined ramp-forming position up to horizontal position where they can be detachably secured so as to cover the ramp recesses in the substructure.

The preferred embodiment of the invention is illustrated in the accompanying drawings in which Fig. 1 is a plan view of our substructure with one ramp up and the other down; Fig. 2 is a side view of the substructure with both ramps up; Fig. 3 is a combined end view and vertical section taken on the line III—III of Fig. 1; and Fig. 4 is a fragmentary vertical section taken on the line IV—IV of Fig. 1, showing a ramp lowered into operative position and supporting the foot of a reclining mast.

Referring to the drawings, a pair of laterally spaced box-like frames A and B, which are quite long in relation to their height and width, are each fabricated from upper and lower pairs of beams 1 and 2 connected by vertical columns 3. The upper beams of each frame are connected by horizontal cross pieces 4. These two frames are spaced the desired distance apart by means of horizontal cross members 5, 6, 7, 8, 9 and 10 detachably connected to the inner upper and lower beams of the frames. The cross members and frames form a framework on which drawworks can be mounted. Each frame supports a pair of conventional derrick shoes 11 and 12 spaced lengthwise thereof. The front shoe 11 is located several feet behind the front end of the frame, while the rear shoe 12 is located at the rear end of the frame. The shoes receive the feet of an oil well derrick, as will be described presently.

Between each front shoe and the front end of the supporting frame the latter is provided between its upper beams 1 with a structural steel slab C. The inner ends of the slabs are connected by hinges 13 to front cross pieces 4, while their outer ends are connected to vertical plates 14 on the ends of the upper beams by means of removable fasteners 16. Each slab includes parallel cross members 17, across which an I-beam 18 extends. Extending along the opposite edges of the top of this beam are spaced plates 19, so that a shallow channel is formed along the top of the beam to provide a track. Each track extends from directly in front of one of the shoes 11 to the front end of the associated substructure frame. By removing fasteners 16, the slabs can be swung down into recesses formed in the frames. Their downward movement is limited by cross members 20 attached to front columns 3, so that the slabs are inclined and the beams 18 therefore form ramps leading up to the front shoes on top of the substructure.

When the slabs are down in inclined position, as shown in Fig. 4, the lower ends of the ramps are adapted to receive small rollers 22 that are mounted in brackets 23 projecting a very short distance down from the front or lower legs 24 of a reclining mast D, which has been assembled from prefabricated sections along the ground in front of the substructure. The rollers preferably are directly below the perforated feet 26 of the mast. Resting on the tapered lower portion of the mast (the portion closest to the substructure) is the usual folded gin pole E whose front feet are pivotally connected to the feet of the mast.

The mast is assembled along the ground with its rollers 22 resting in the lower ends of the ramp channels. The mast, with the folded gin pole resting on it, then is moved back toward the substructure. This can be done in several ways, such as by a bridle that has its ends connected to opposite sides of the substructure and that extends out into the mast where it is connected to the travelling block. When the drilling line to the draw works is reeled in, it pulls the crown block toward the travelling block and thereby forces the mast rollers 22 to roll up the ramps until the feet are in the front shoes 11. The feet 26 then can be fastened in the shoes by pivot pins, following which the gin pole E can be swung up into upright position and its back feet connected to the rear shoes 12 in the usual manner. Then the mast is swung up and back into upright position against the gin pole as indicated in broken lines in Fig. 4. When the mast is lowered, this procedure is just reversed.

By locating the rollers as close as possible to the feet of the mast, normal slight variations in the height of the outer end of the reclining mast relative to the substructure will not tilt the feet enough around the rollers to make it difficult to pin them to the shoes. When the mast is in upright position on the substructure the slabs C are swung up to the top of the frame recesses and fastened there by fasteners 16. Flooring then can be laid

across the slabs as well as on the rest of the substructure.

According to the provisions of the patent statutes, we have explained the principle of our invention and have illustrated and described what we now consider to represent its best embodiment. However, we desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

We claim:

1. A well drilling structure comprising a substructure framework, a pair of laterally spaced shoes mounted on the framework near its front end and several feet above the ground, forwardly and downwardly extending ramps disposed in front of the shoes in alignment therewith and supported entirely by said framework, a drilling mast extending above said framework and having a pair of feet at the lower end of the front side of the mast, means detachably pivoting the feet to said shoes, and small rollers projecting a very short distance from the front side of the mast approximately in front of said feet, said rollers being in alignment with the ramps in order to engage the upper ends of the ramps when the mast is swung forward and down to reclining position along the ground, whereby the rollers can roll down the ramps after said feet have been disconnected from the shoes and thereby carry the feet down to a lower level.

2. A well drilling structure comprising a substructure framework, a pair of laterally spaced shoes mounted on the framework near its front end several feet above the ground, the framework being provided with an open top recess extending from each shoe forward through the front end of the framework, ramps disposed in said recesses and extending forward and downward from the shoes in alignment therewith, means hinging the upper ends of the ramps to said framework to permit the ramps to be raised to horizontal position, removable cross members for the tops of said recesses connected to the ramps for movement with them, a drilling mast extending above said framework and having a pair of feet at the lower

end of the front side of the mast, means detachably pivoting the feet to said shoes, and small rollers projecting a short distance from the front side of the mast at said feet, said rollers being in alignment with the ramps in order to engage the ramps and roll down them after the mast is swung forward and down to reclining position along the ground following lowering of the ramps and said cross members from the tops of said recesses.

3. A well drilling structure comprising a substructure framework, a pair of laterally spaced shoes mounted on the framework near its front end several feet above the ground, the framework being provided with an open top recess extending from each shoe forward through the front end of the framework, ramps disposed in said recesses and extending forward and downward from the shoes in alignment therewith, means hinging the upper ends of the ramps to said framework to permit the ramps to be raised to horizontal position to form part of the top of the framework, a drilling mast extending above said framework and having a pair of feet at the lower end of the front side of the mast, and means detachably pivoting the feet to said shoes, the mast being provided with ramp-engageable surfaces at the front of said feet, said surfaces being in alignment with the ramps in order to engage the upper ends of the ramps and move down them after the mast is swung forward and down to reclining position along the ground following lowering of the ramps from the tops of said recesses.

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